

CLAIMS

What is claimed is:

1. A gypsum board, comprising:
 - a. a gypsum layer having a first face and a second face and comprising set gypsum; and
 - b. first and second facers affixed to said first and second faces, said first facer being a fibrous mat comprising a non-woven web bonded together with a resinous binder, and said web comprising a blend of a major portion composed of chopped continuous glass fibers having an average fiber diameter ranging from about 8 to 17 μm and a minor portion composed of fine staple fibers having an average fiber diameter of less than about 5.5 μm , said minor portion comprising about 1-30 percent of the dry weight of the web.
2. A gypsum board as recited by claim 1, wherein said chopped continuous glass fibers are composed of at least one member selected from the group consisting of E glass, C glass, T glass, sodium borosilicate glass, and mixtures thereof.
3. A gypsum board as recited by claim 1, wherein said chopped continuous glass fibers are composed of E glass.
4. A gypsum board as recited by claim 1, wherein said chopped continuous glass fibers have an average fiber diameter ranging from about 10 to 16 μm .
5. A gypsum board as recited by claim 1, wherein said chopped continuous glass fibers have an average fiber length ranging from about 5 to 30 mm.
6. A gypsum board as recited by claim 1, wherein said chopped continuous glass fibers have an average fiber diameter of about $11 \pm 1.5 \mu\text{m}$.
7. A gypsum board as recited by claim 1, wherein said chopped continuous glass fibers have an average fiber length ranging from about 6 to 12 mm.
8. A gypsum board as recited by claim 1, wherein said fine staple fibers comprise at least one member selected from the group consisting of glass, mineral, and polymer microfibers.
9. A gypsum board as recited by claim 1, wherein said fine staple fibers are composed of at least one member selected from the group consisting of fibers of glass, mineral wool, slag wool, ceramic, carbon, metal, refractory

materials, melt-blown micro-denier synthetic fibers, and mixtures thereof.

10. A gypsum board as recited by claim 9, wherein said melt-blown micro-denier synthetic fiber is at least one of polyester, nylon, polyethylene, and polypropylene fiber.
11. A gypsum board as recited by claim 9, wherein said fine staple fibers are composed of C-glass.
12. A gypsum board as recited by claim 1, wherein said fine staple fibers have an average fiber diameter of less than about 3.5 μm .
13. A gypsum board as recited by claim 1, wherein said fine staple fibers have an average fiber diameter of less than about 1.9 μm .
14. A gypsum board as recited by claim 1, wherein said fine staple fibers have a fiber length of less than about 7 mm.
15. A gypsum board as recited by claim 1, wherein said minor portion comprises a portion of the weight of the dry web ranging from about 20 to 30 percent.
16. A gypsum board as recited by claim 1, said second facer comprising kraft paper.
17. A gypsum board as recited by claim 1, said second facer comprising a fibrous mat.
18. A gypsum board as recited by claim 1, wherein said resinous binder is composed of at least one member selected from the group consisting of urea formaldehyde; conventional modified urea formaldehyde; acrylic resin; melamine resin; high nitrogen melamine resin; homopolymer and copolymer of polyacrylic acid having a molecular weight of less than 10,000; crosslinking acrylic copolymer; crosslinked vinyl chloride acrylate copolymer; and modified acrylic latex binder.
19. A gypsum board as recited by claim 1, wherein said resinous binder is composed of a modified acrylic latex binder.
20. A gypsum board as recited by claim 18, wherein said resinous binder further comprises a cross-linker in an amount ranging up to about 10 weight percent.
21. A gypsum board as recited by claim 20, wherein said cross linker is present in an amount ranging from about 2 to 5 weight percent.
22. A gypsum board as recited by claim 20, wherein said cross linker comprises melamine formaldehyde.

23. A gypsum board as recited by claim 1, wherein said resinous binder has a glass transition temperature ranging from about 15 to 45°C.
24. A gypsum board as recited by claim 1, wherein said fibrous mat further comprises effective amounts of fine particles of limestone, glass, clay, coloring pigments, biocide, fungicide, intumescent material, or mixtures thereof.
25. A gypsum board as recited by claim 1, wherein said gypsum core further comprises at least one water repellent agent.
26. A gypsum board as recited by claim 1, wherein said gypsum core further comprises a biocide.
27. A gypsum board as recited by claim 1, wherein said gypsum core further comprises reinforcing fiber.
28. A gypsum board as recited by claim 1, said board having flame resistance sufficient to pass the test of ASTM Method E84, Class 1.
29. In a gypsum board having a first face and a second face and a non-woven fibrous mat affixed to at least one of said faces, the improvement wherein said mat comprises a web bonded together with a resinous binder and comprising a blend of a major portion composed of chopped continuous glass fibers having an average fiber diameter ranging from about 8 to 17 µm and a minor portion composed of fine staple fibers having an average fiber diameter of less than about 5.5 µm, said minor portion comprising about 1-30 percent of the dry weight of the web.
30. A process for manufacturing an article comprising a hydraulic set material layer having first and second faces, and first and second facers affixed thereto, at least one of said facers comprising a non-woven, fibrous mat, the process comprising:
 - a. forming an aqueous slurry comprising at least one member selected from the group consisting of anhydrous calcium sulfate, calcium sulfate hemi-hydrate, and hydraulic setting cement;
 - b. distributing the slurry to form a layer on said first facing;
 - c. applying said second facing onto the top of said layer;
 - d. separating the resultant laminate into individual articles; and
 - e. drying the articles,

wherein at least one of the facers comprises a fibrous mat having a

fibrous web comprised of a blend of a major portion of chopped continuous glass fibers, an average fiber diameter of which is in the range of about 8 to 17 μm and a minor portion of which is composed of fine staple fibers having an average fiber diameter of less than about 5.5 μm , said minor portion comprising about 1-30 percent of the dry weight of the web, and said major and minor portions being bound together with a resinous binder.

31. For use as a facer for a gypsum board, a fibrous mat comprising a non-woven web bonded together with a resinous binder, said web comprising a blend of a major portion composed of chopped continuous glass fibers having an average fiber diameter ranging from about 8 to 17 μm and a minor portion composed of fine staple fibers having an average fiber diameter of less than about 5.5 μm , said minor portion comprising about 1-30 percent of the dry weight of the web, and the resinous binder comprising a modified acrylic latex binder.
32. A fibrous mat comprising a non-woven web bonded together with a resinous binder, said web comprising a blend of a major portion composed of chopped continuous glass fibers having an average fiber diameter ranging from about 8 to 17 μm and a minor portion composed of fine staple fibers having an average fiber diameter of less than about 5.5 μm , said minor portion comprising about 1-30 percent of the dry weight of the web, the mat having a permeability of at least about 250 cfm/ft² measured in accordance with ASTM Standard D737 at a differential pressure of 0.5 inches of water.
33. A hydraulic set board, comprising:
 - a. a hydraulic set material layer having a first and a second face; and
 - b. first and second facers affixed to said first and second faces, at least one of said facers comprising a fibrous mat comprising a non-woven web bonded together with a resinous binder, said web comprising a blend of a major portion composed of chopped continuous glass fibers having an average fiber diameter ranging from about 8 to 17 μm and a minor portion composed of fine staple fibers having an average fiber diameter of less than about 5.5 μm , said minor portion comprising about 1-30 percent of the dry weight of the web.